

RECEIVED

MAY 09 2001 1652

TECH CENTER 1600/2900

ENTERED

RAW SEQUENCE LISTING
PATENT APPLICATION: US/09/623,596

DATE: 04/30/2001
TIME: 18:00:49

Input Set : A:\PTO.txt
Output Set: N:\CRF3\04302001\I623596.raw

3 <110> APPLICANT: WACHI, MASAAKI
4 NAGAI, KAZUO
6 <120> TITLE OF INVENTION: A GENE CODING FOR PENICILLIN BINDING PROTEIN AND A METHOD FOR PRODUCING
7 L-GLUTAMIC ACID
9 <130> FILE REFERENCE: 196811USOPCT
11 <140> CURRENT APPLICATION NUMBER: 09/623,596
12 <141> CURRENT FILING DATE: 2000-09-05
14 <150> PRIOR APPLICATION NUMBER: PCT/JP99/01084
15 <151> PRIOR FILING DATE: 1999-03-05
17 <150> PRIOR APPLICATION NUMBER: JP10-55608
18 <151> PRIOR FILING DATE: 1998-03-06
20 <160> NUMBER OF SEQ ID NOS: 6
22 <170> SOFTWARE: PatentIn version 3.0
24 <210> SEQ ID NO: 1
25 <211> LENGTH: 5345
26 <212> TYPE: DNA
27 <213> ORGANISM: Brevibacterium lactofermentum
29 <220> FEATURE:
30 <221> NAME/KEY: CDS
31 <222> LOCATION: (881)..(2623)
33 <220> FEATURE:
34 <221> NAME/KEY: CDS
35 <222> LOCATION: (2790)..(4454)
37 <220> FEATURE:
38 <221> NAME/KEY: CDS
39 <222> LOCATION: (4467)..(5345)
41 <400> SEQUENCE: 1
42 aagcttcggg gagggcgcg tcgataagca cgcaacctcg tcgtgacatg gcgcgcgaaa 60
44 ggaacaacc cgggccttg tgaaccttg cgtgcagcaa cgcgtaattg atgcagcaca 120
46 agctgggctc tcagcaggtt atgtcggtgc gtggtcgccc cgttgaggca aaacgtgctg 180
48 atcctaaggt gatccagctg tctgtgctgg tggttatcct gctgtgcggt ggtgttgccg 240
50 cgaccatggg tctgtccgga acgtctacac agcagacttt ccagttgcag gaacttcagg 300
52 caactgaaac ggatttgagc aatcgcattg agtctctcaa ccgagatgtg gaagatgctc 360
54 gctcagcagc aaccttgcca gcgaatgcta cggagatggg cttggtatcc ccagtggaac 420
56 ctggcgctgct cgcagtgca gaaaacgggt atgttgtgga ggagcgcgaa caaatccaga 480
58 gacacgccct atagttgaca tcaatggaca acagaccgga ccaaatcggg catcaagcaa 540
60 ccctgacgag actaacgcat actgaaaacc tccaggcgat tccacaagaa gcagcagctc 600
62 cgccgtatca gaccaaacct gttccttatg ctgcaaccac cggacaagca ggtggcgca 660
64 ggcagtgact ttcccagca atggcagaag tcggggcgag cgtgcgggac gtgaagatac 720
66 gtcccgccgt tcggcgatc aggacgaaa cagaagagcc gctagagagc gcgaacttac 780
68 gcgacgcagc ggtaaaagcta aaggcgtaaa ccaagaagaa ggagtgaact accggcctaa 840
70 atcttcaacc cagggcggcg cacgcaagcg acgtgtgaac atg gtt acc cgt atc 895
71 Met Val Thr Arg Ile
72 1 5
74 gca ttg gtc atc gct ggc gta ctg atc att cgc ctc ggc tgg gtc caa 943
75 Ala Leu Val Ile Ala Gly Val Leu Ile Ile Arg Leu Gly Trp Val Gln
76 10 15 20

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/623,596

DATE: 04/30/2001

TIME: 18:00:49

Input Set : A:\PTO.txt

Output Set: N:\CRF3\04302001\I623596.raw

78	gtt	gtc	tg	gga	cca	gaa	ctg	tcc	ctc	aat	gct	tcg	gaa	cag	cgc	acc	991
79	Val	Val	Trp	Gly	Pro	Glu	Leu	Ser	Leu	Asn	Ala	Ser	Glu	Gln	Arg	Thr	
80				25					30					35			
82	cgc	gtg	tac	gta	gat	cct	gca	cgc	cgt	gga	acc	atc	gtg	gac	cgc	gaa	1039
83	Arg	Val	Tyr	Val	Asp	Pro	Ala	Arg	Arg	Gly	Thr	Ile	Val	Asp	Arg	Glu	
84		40					45						50				
86	gga	aac	cag	atg	gcg	tac	acg	atg	cag	gca	cgt	tcg	ctg	acg	gtt	tct	1087
87	Gly	Asn	Gln	Met	Ala	Tyr	Thr	Met	Gln	Ala	Arg	Ser	Leu	Thr	Val	Ser	
88		55					60					65					
90	ccg	aac	atc	atg	cgt	gag	gaa	tta	aag	acc	gga	act	gat	ctg	gcc	ttg	1135
91	Pro	Asn	Ile	Met	Arg	Glu	Glu	Leu	Lys	Thr	Gly	Thr	Asp	Leu	Ala	Leu	
92	70					75				80				85			
94	cgt	ttg	gcg	gct	gaa	gaa	acc	gat	ccg	gaa	aac	gtg	gcc	agc	tat	gtg	1183
95	Arg	Leu	Ala	Ala	Glu	Thr	Asp	Pro	Glu	Asn	Val	Ala	Ser	Tyr	Val		
96				90					95				100				
98	acc	atc	gaa	gaa	ggc	aac	gcg	tat	gtt	ttt	gcg	tct	gaa	gaa	cag	cgc	1231
99	Thr	Ile	Glu	Glu	Gly	Asn	Ala	Tyr	Val	Phe	Ala	Ser	Glu	Glu	Gln	Arg	
100				105					110				115				
102	gaa	acc	att	ctg	tcc	gac	aag	gta	gaa	gag	cgt	att	caa	agc	att	gcg	1279
103	Glu	Thr	Ile	Leu	Ser	Asp	Lys	Val	Glu	Glu	Arg	Ile	Gln	Ser	Ile	Ala	
104			120				125						130				
106	gat	cgg	atc	cct	gag	atc	atc	aaa	tcc	cat	gac	caa	gat	gtc	act	gga	1327
107	Asp	Arg	Ile	Pro	Glu	Ile	Ile	Lys	Ser	His	Asp	Gln	Asp	Val	Thr	Gly	
108		135					140					145					
110	att	tcc	tct	gag	gag	atc	ctg	gac	aag	ctc	aat	gca	gat	agc	cag	tat	1375
111	Ile	Ser	Ser	Glu	Glu	Ile	Leu	Asp	Lys	Leu	Asn	Ala	Asp	Ser	Gln	Tyr	
112	150				155					160				165			
114	gag	gtg	ctc	gtc	cgc	aat	gtt	gat	ccc	gat	gta	gcg	tca	gaa	atc	acc	1423
115	Glu	Val	Leu	Val	Arg	Asn	Val	Asp	Pro	Asp	Val	Ala	Ser	Glu	Ile	Thr	
116				170					175				180				
118	gat	gag	atg	ccc	agc	gtc	gca	gct	gat	cat	caa	gac	atc	cgc	caa	tac	1471
119	Asp	Glu	Met	Pro	Ser	Val	Ala	Ala	Asp	His	Gln	Asp	Ile	Arg	Gln	Tyr	
120			185						190				195				
122	cca	aac	ggc	gcg	att	ggt	gaa	aac	atc	atc	ggt	cga	atc	agc	atg	gac	1519
123	Pro	Asn	Gly	Ala	Ile	Gly	Glu	Asn	Ile	Ile	Gly	Arg	Ile	Ser	Met	Asp	
124		200					205					210					
126	ggc	gaa	ggc	cag	ttc	ggc	ttt	gag	gct	tcc	aac	gat	tcc	ctg	ttg	gca	1567
127	Gly	Glu	Gly	Gln	Phe	Gly	Phe	Glu	Ala	Ser	Asn	Asp	Ser	Leu	Leu	Ala	
128		215					220					225					
130	gga	aac	aac	ggt	cgc	tca	acc	cag	gac	atg	tcc	att	ttg	gga	caa	gca	1615
131	Gly	Asn	Asn	Gly	Arg	Ser	Thr	Gln	Asp	Met	Ser	Ile	Leu	Gly	Gln	Ala	
132	230				235					240			245				
134	atc	ccg	ggc	acg	ttg	agg	gat	caa	att	cca	gcc	att	gat	ggt	gcc	agc	1663
135	Ile	Pro	Gly	Thr	Leu	Arg	Asp	Gln	Ile	Pro	Ala	Ile	Asp	Gly	Ala	Ser	
136				250					255				260				
138	gtt	gaa	ctc	acc	gtt	gat	ctg	gat	ctg	caa	acc	tat	gtg	cag	cag	gca	1711
139	Val	Glu	Leu	Thr	Val	Asp	Leu	Asp	Leu	Gln	Thr	Tyr	Val	Gln	Gln	Ala	
140				265					270				275				
142	ttg	gag	cag	gcg	aaa	gct	aac	tcc	ggt	gca	gaa	aac	gcc	tcc	gct	gtg	1759

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/623,596

DATE: 04/30/2001

TIME: 18:00:49

Input Set : A:\PTO.txt

Output Set: N:\CRF3\04302001\I623596.raw

143	Leu	Glu	Gln	Ala	Lys	Ala	Asn	Ser	Gly	Ala	Glu	Asn	Ala	Ser	Ala	Val	
144			280					285					290				
146	gtt	ctt	gat	gcc	gag	acc	gct	gag	gtt	ttg	gcg	atg	gca	aac	acc	gat	1807
147	Val	Leu	Asp	Ala	Glu	Thr	Ala	Glu	Val	Leu	Ala	Met	Ala	Asn	Thr	Asp	
148		295					300					305					
150	acc	atc	aac	ccc	aac	gaa	gac	acg	gga	aag	cag	att	gag	cag	ggc	aag	1855
151	Thr	Ile	Asn	Pro	Asn	Glu	Asp	Thr	Gly	Lys	Gln	Ile	Glu	Gln	Gly	Lys	
152	310					315					320				325		
154	agc	ttt	gac	aat	cct	tct	gtc	acc	cac	ccc	ttc	gag	cct	ggt	tct	gta	1903
155	Ser	Phe	Asp	Asn	Pro	Ser	Val	Thr	His	Pro	Phe	Glu	Pro	Gly	Ser	Val	
156				330						335				340			
158	gcc	aag	gtg	att	act	gca	gca	ggc	gta	att	caa	gac	ggc	ttg	act	act	1951
159	Ala	Lys	Val	Ile	Thr	Ala	Ala	Gly	Val	Ile	Gln	Asp	Gly	Leu	Thr	Thr	
160			345						350					355			
162	cca	gat	gaa	gtg	ttg	cag	gta	ccg	ggc	agt	att	gaa	atg	gcc	ggt	gtt	1999
163	Pro	Asp	Glu	Val	Leu	Gln	Val	Pro	Gly	Ser	Ile	Glu	Met	Ala	Gly	Val	
164		360						365				370					
166	tct	gtc	ggt	gat	gcg	tgg	gac	cac	ggt	gtc	gtt	ccc	tat	acc	act	gca	2047
167	Ser	Val	Gly	Asp	Ala	Trp	Asp	His	Gly	Val	Val	Pro	Tyr	Thr	Thr	Ala	
168		375					380					385					
170	gga	att	ttt	ggt	aag	tcc	tcg	aat	gta	ggc	act	ctg	atg	ctt	gcg	cac	2095
171	Gly	Ile	Phe	Gly	Lys	Ser	Ser	Asn	Val	Gly	Thr	Leu	Met	Leu	Ala	His	
172	390					395					400				405		
174	ggt	ctt	ggt	gaa	gat	aaa	ttt	gct	gat	tac	ctg	gaa	cga	ttc	ggt	gtg	2143
175	Gly	Leu	Gly	Glu	Asp	Lys	Phe	Ala	Asp	Tyr	Leu	Glu	Arg	Phe	Gly	Val	
176			410						415					420			
178	gga	cag	tca	acg	ggt	att	gag	ctt	ccg	agc	gaa	tcc	caa	ggc	ctg	ctg	2191
179	Gly	Gln	Ser	Thr	Gly	Ile	Glu	Leu	Pro	Ser	Glu	Ser	Gln	Gly	Leu	Leu	
180			425						430				435				
182	ccc	gca	cgt	gag	cag	tgg	tct	ggc	ggt	act	ttt	gct	aac	ctg	ccc	atc	2239
183	Pro	Ala	Arg	Glu	Gln	Trp	Ser	Gly	Gly	Thr	Phe	Ala	Asn	Leu	Pro	Ile	
184		440					445					450					
186	ggt	cag	ggt	atg	tcg	atc	acc	acg	ttg	caa	atg	gct	gga	atc	tac	caa	2287
187	Gly	Gln	Gly	Met	Ser	Ile	Thr	Thr	Leu	Gln	Met	Ala	Gly	Ile	Tyr	Gln	
188		455				460					465						
190	gcc	ttg	gcc	aac	gat	ggt	gaa	cgc	att	gaa	ccg	cgg	atc	atc	aag	agc	2335
191	Ala	Leu	Ala	Asn	Asp	Gly	Glu	Arg	Ile	Glu	Pro	Arg	Ile	Ile	Lys	Ser	
192	470				475						480				485		
194	gtg	act	gat	tct	gac	gga	aca	gtc	cta	gag	cag	ccg	gaa	ccc	gat	aaa	2383
195	Val	Thr	Asp	Ser	Asp	Gly	Thr	Val	Leu	Glu	Gln	Pro	Glu	Pro	Asp	Lys	
196			490						495				500				
198	atc	cag	gtt	gtc	agc	gct	gaa	gct	gcc	cgc	acc	acg	gtg	gat	atg	ttt	2431
199	Ile	Gln	Val	Val	Ser	Ala	Glu	Ala	Ala	Arg	Thr	Thr	Val	Asp	Met	Phe	
200			505						510				515				
202	agg	tct	gtc	acc	cag	gtt	gat	cca	ctt	gga	gtg	cac	aag	gta	ccg	ctc	2479
203	Arg	Ser	Val	Thr	Gln	Val	Asp	Pro	Leu	Gly	Val	His	Lys	Val	Pro	Leu	
204		520					525				530						
206	cag	acg	cct	cca	ttg	agg	gtt	atc	aaa	tct	cag	gta	aga	cag	gta	cgg	2527
207	Gln	Thr	Pro	Pro	Leu	Arg	Val	Ile	Lys	Ser	Gln	Val	Arg	Gln	Val	Arg	

RAW SEQUENCE LISTING

DATE: 04/30/2001

PATENT APPLICATION: US/09/623,596

TIME: 18:00:49

Input Set : A:\PTO.txt

Output Set: N:\CRF3\04302001\I623596.raw

```

208      535      540      545
210 cgc aaa aag ttg acc cca aca cgg gcg cgt act cta act cgc aat act 2575
211 Arg Lys Lys Leu Thr Pro Thr Arg Ala Arg Thr Leu Thr Arg Asn Thr
212 550      555      560      565
214 gga tta cct tct cgg gta ttg cac cgg ctg atg atc ctc gat ttg ttg 2623
215 Gly Leu Pro Ser Arg Val Leu His Pro Leu Met Ile Leu Asp Leu Leu
216      570      575      580
218 tagccatcat gcttgatgag ccagaacgcg gagtccacgg tgggtggcggc caaaccgcag 2683
220 cacctttggt caaagacatc gccacctggt tgctcaaccg cgacaacatc ccactgtctg 2743
222 cagccaccga accgatcatc ctccaagctc aataactcaa acagaa gtg tct ttt 2798
223      Val Ser Phe
226 gta gaa ttt cat aat ctg aac ttt tgt ttg aac tct ttt cgg cat cac 2846
227 Val Glu Phe His Asn Leu Asn Phe Cys Leu Asn Ser Phe Arg His His
228 585      590      595      600
230 cca cgt gcc gcg tcc gaa tta tta aca cct aga aac ctg tgg agg aga 2894
231 Pro Arg Ala Ala Ser Glu Leu Leu Thr Pro Arg Asn Leu Trp Arg Arg
232      605      610      615
234 gaa aac cat ggc aac cac gtt gct gga cct cac caa act tat cga tgg 2942
235 Glu Asn His Gly Asn His Val Ala Gly Pro His Gln Thr Tyr Arg Trp
236      620      625      630
238 cat cct caa ggg ctc tgc cag ggc gtt ccc gct cac gca gta ggg gaa 2990
239 His Pro Gln Gly Leu Cys Gln Gly Val Pro Ala His Ala Val Gly Glu
240      635      640      645
242 caa gca atc gcg gct att ggt ctt gac tcc tcc agc ttg cct acc tcg 3038
243 Gln Ala Ile Ala Ala Ile Gly Leu Asp Ser Ser Leu Pro Thr Ser
244      650      655      660
246 gac gct att ttt gct gca gtt cca gga acc cgc act cac ggc gca cag 3086
247 Asp Ala Ile Phe Ala Ala Val Pro Gly Thr Arg Thr His Gly Ala Gln
248 665      670      675      680
250 ttt gca ggt acg gat aac gct gcg aaa gct gtg gcc att ttg act gac 3134
251 Phe Ala Gly Thr Asp Asn Ala Ala Lys Ala Val Ala Ile Leu Thr Asp
252      685      690      695
254 gca gct gga ctt gag gtg ctc aac gaa gca gga gag acc cgc cca atc 3182
255 Ala Ala Gly Leu Glu Val Leu Asn Glu Ala Gly Glu Thr Arg Pro Ile
256      700      705      710
258 atc gtt gtt gat gat gtc cgc gca gta ctt ggc gca gca tca tca agc 3230
259 Ile Val Val Asp Asp Val Arg Ala Val Leu Gly Ala Ala Ser Ser Ser
260      715      720      725
262 att tat ggc gat cct tca aaa gat ttc acg ctc att gga gtc act gga 3278
263 Ile Tyr Gly Asp Pro Ser Lys Asp Phe Thr Leu Ile Gly Val Thr Gly
264      730      735      740
266 acc tca ggt aaa acc acc acc agc tac ctc ttg gaa aaa gga ctc atg 3326
267 Thr Ser Gly Lys Thr Thr Thr Ser Tyr Leu Leu Glu Lys Gly Leu Met
268 745      750      755      760
270 gag gca ggc cac aaa gtt ggt ttg atc ggc acc aca ggt aca cgt ata 3374
271 Glu Ala Gly His Lys Val Gly Leu Ile Gly Thr Thr Gly Thr Arg Ile
272      765      770      775
274 gat ggg gaa gaa gta ccc acg aag ctc acc act cca gaa gcg ccg act 3422
275 Asp Gly Glu Glu Val Pro Thr Lys Leu Thr Thr Pro Glu Ala Pro Thr

```

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/623,596

DATE: 04/30/2001

TIME: 18:00:49

Input Set : A:\PTO.txt

Output Set: N:\CRF3\04302001\I623596.raw

276		780		785		790											
278	ctg	cag	gca	ttg	ttt	gct	cga	atg	cgc	gat	cac	ggt	gtc	acc	cac	gtg	3470
279	Leu	Gln	Ala	Leu	Phe	Ala	Arg	Met	Arg	Asp	His	Gly	Val	Thr	His	Val	
280			795						800				805				
282	gtg	atg	gaa	gta	tcc	agc	cat	gca	ttg	tca	ttg	ggc	agg	gtt	gcg	ggt	3518
283	Val	Met	Glu	Val	Ser	Ser	His	Ala	Leu	Ser	Leu	Gly	Arg	Val	Ala	Gly	
284		810						815				820					
286	tcc	cac	ttt	gat	gta	gct	gcg	ttt	acc	aac	ctg	tcg	cag	gat	cac	ctt	3566
287	Ser	His	Phe	Asp	Val	Ala	Ala	Phe	Thr	Asn	Leu	Ser	Gln	Asp	His	Leu	
288	825					830				835				840			
290	gat	ttc	cac	ccc	acc	atg	gat	gat	tac	ttt	gac	gcg	aag	gca	ttg	ttc	3614
291	Asp	Phe	His	Pro	Thr	Met	Asp	Asp	Tyr	Phe	Asp	Ala	Lys	Ala	Leu	Phe	
292					845					850				855			
294	ttc	cgc	gca	gat	tct	cca	ctt	gtg	gct	gac	aaa	cag	gtc	gtg	tgc	gtg	3662
295	Phe	Arg	Ala	Asp	Ser	Pro	Leu	Val	Ala	Asp	Lys	Gln	Val	Val	Cys	Val	
296			860					865				870					
298	gat	gat	tct	tgg	ggt	cag	cgc	atg	gcc	agc	gtg	gca	gcg	gat	gtg	caa	3710
299	Asp	Asp	Ser	Trp	Gly	Gln	Arg	Met	Ala	Ser	Val	Ala	Ala	Asp	Val	Gln	
300			875					880				885					
302	aca	gta	tcc	acc	ctt	ggg	caa	gaa	gca	gac	ttc	agc	gct	aca	gat	atc	3758
303	Thr	Val	Ser	Thr	Leu	Gly	Gln	Glu	Ala	Asp	Phe	Ser	Ala	Thr	Asp	Ile	
304		890				895					900						
306	aat	gtc	agc	gac	tct	ggc	gcc	cag	agt	ttt	aag	atc	aac	gcc	ccc	tca	3806
307	Asn	Val	Ser	Asp	Ser	Gly	Ala	Gln	Ser	Phe	Lys	Ile	Asn	Ala	Pro	Ser	
308	905				910					915				920			
310	aac	cag	tcc	tac	cag	gtc	gag	cta	gcc	ctt	cca	ggt	gcg	ttc	aac	gtt	3854
311	Asn	Gln	Ser	Tyr	Gln	Val	Glu	Leu	Ala	Leu	Pro	Gly	Ala	Phe	Asn	Val	
312			925					930				935					
314	gct	aac	gcc	acg	ttg	gca	ttt	gcc	gct	gcg	gca	ccg	tgg	gtg	ttg	atg	3902
315	Ala	Asn	Ala	Thr	Leu	Ala	Phe	Ala	Ala	Ala	Ala	Pro	Trp	Val	Leu	Met	
316			940					945				950					
318	gcg	acg	ttt	gct	cga	ggc	atg	tcc	aag	gtc	gcg	gtt	cca	ggc	cgt	atg	3950
319	Ala	Thr	Phe	Ala	Arg	Gly	Met	Ser	Lys	Val	Ala	Val	Pro	Gly	Arg	Met	
320			955				960					965					
322	gaa	cgc	att	gat	gag	gga	caa	gac	ttc	ctt	gca	gtg	gtg	gat	tat	gcc	3998
323	Glu	Arg	Ile	Asp	Glu	Gly	Gln	Asp	Phe	Leu	Ala	Val	Val	Asp	Tyr	Ala	
324		970				975					980						
326	cac	aag	cct	gct	gca	gtg	gct	gct	gtg	ttg	gat	acg	ttg	agg	acc	cag	4046
327	His	Lys	Pro	Ala	Ala	Val	Ala	Ala	Val	Leu	Asp	Thr	Leu	Arg	Thr	Gln	
328	985				990					995				1000			
330	att	gac	ggg	cgc	ctc	gga	agt	ggt	tat	cgg	tgc	tgg	tgg	aga	cgc		4091
331	Ile	Asp	Gly	Arg	Leu	Gly	Ser	Gly	Tyr	Arg	Cys	Trp	Trp	Arg	Arg		
332			1005						1010					1015			
334	gat	tcc	acc	aag	cgt	ggc	ccc	atg	ggc	agt	tgt	ccg	cac	agg	tct		4136
335	Asp	Ser	Thr	Lys	Arg	Gly	Pro	Met	Gly	Ser	Cys	Pro	His	Arg	Ser		
336			1020						1025					1030			
338	gga	tct	agt	tat	tgt	act	gat	gca	aac	ctc	gtc	aga	gtg	gct	ggc		4181
339	Gly	Ser	Ser	Tyr	Cys	Thr	Asp	Ala	Asn	Leu	Val	Arg	Val	Ala	Gly		
340			1035						1040					1045			

VERIFICATION SUMMARY

PATENT APPLICATION: US/09/623,596

DATE: 04/30/2001

TIME: 18:00:50

Input Set : A:\PTO.txt

Output Set: N:\CRF3\04302001\I623596.raw